CLAIMS

1. A large area plasma deposition system, comprising:

A. an electron beam source having a width much larger in dimension than its thickness;

B. a plasma sheet produced by said electron beam passing through a gas; said plasma being a low electron temperature plasma sheet of pre-determined width, length, thickness, and location relative to a surface;

C. magnetic means for confining said beam so as to produce a geometrically well defined, spatially uniform plasma sheet;

D. a target comprising a material source for thin films or coatings;

E. a substrate upon which material sputtered from said target by said plasma is deposited as a thin film or coating.

2. The system according to claim 1, wherein said target is electrically biased above a sputtering threshold for said material source.

3. The system according to claim 2, wherein said electrical bias is selected from DC or RF sources.

4. The system according to claim 1, wherein said substrate is electrically biased.

5. The system according to claim 4, wherein said electrical bias is selected from DC or RF sources.

6. The system according to claim 1, wherein the relative position of said beam, plasma, target and substrate is adjustable.

7. The system according to claim 1, wherein said film or coating material source is selected from the group consisting of metals, alloys, semiconductors or non-conducting materials.

8. The system according to claim 1, wherein said electron beam source is selected from the group of sources consisting of a linear hollow cathode beam source, hot filament or field emitting electron source.

9. The system according to claim 1, wherein said gas is selected from the group consisting of atomic or molecular gases or mixtures thereof.

10. The system according to claim 1, wherein both target and substrate are electrically biased.

11. A hybrid large area plasma deposition system, comprising:

A. the electron beam plasma system defined in steps A. through C. of claim 1;

B. in conjunction with said plasma system, a conventional physical vapor deposition (PVD) system for generating material for coating or deposition on a substrate, said materials being generated from a film material source by sputtering means or vaporization means.

12. The hybrid system of claim 13, wherein said sputtering means is selected from the group consisting of magnetrons or ion beams.

13. The hybrid system of claim 14, wherein said vaporization means is selected from the group consisting of electron beams, lasers or thermal sources.

14. The hybrid system according to claim 13, wherein said electron beam produced plasma is located between said source material and said substrate